

Aspects of convection at prospective TWP sites in the Tropical Western and Eastern Pacific regions

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Climatological considerations for TWP science objectives

- 1. Frequency of deep convection within range of aircraft**
- 2. Frequency of high-level and thin cirrus**
- 3. Tropopause temperatures**
- 4. Lower stratospheric water vapor**
- 5. Interannual variability of convection - ENSO**
- 6. Intraseasonal variations - Madden-Julian oscillation (MJO)**

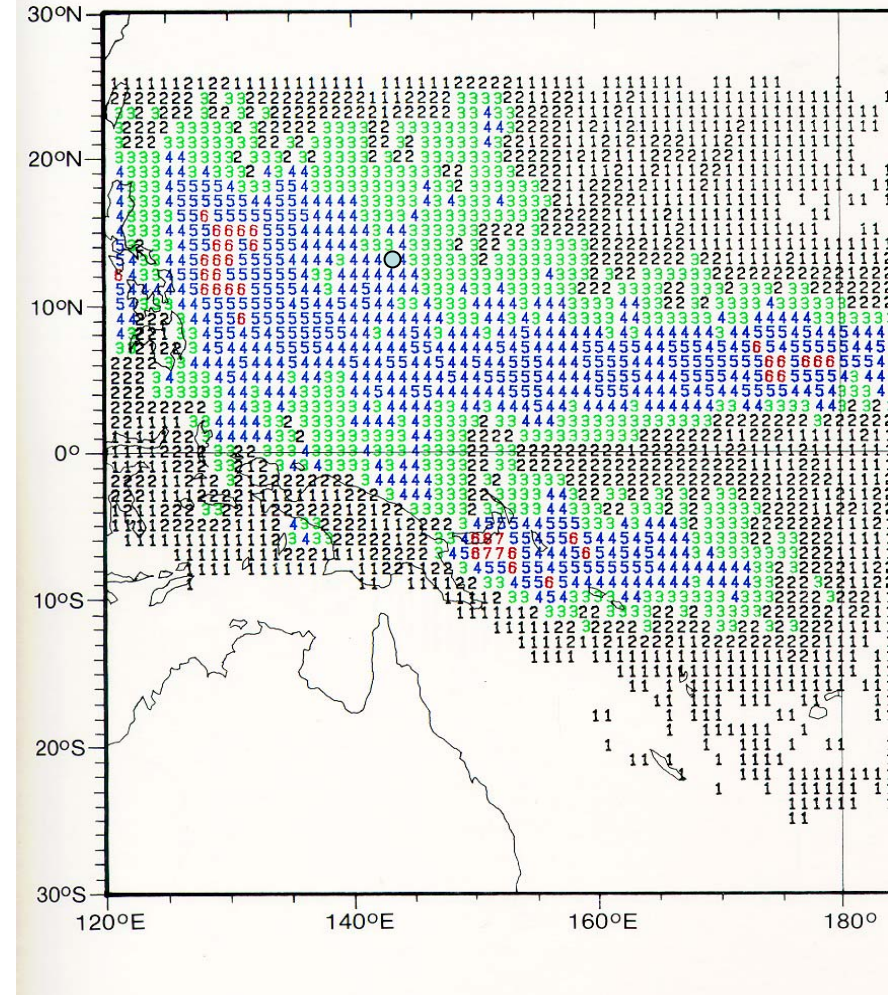
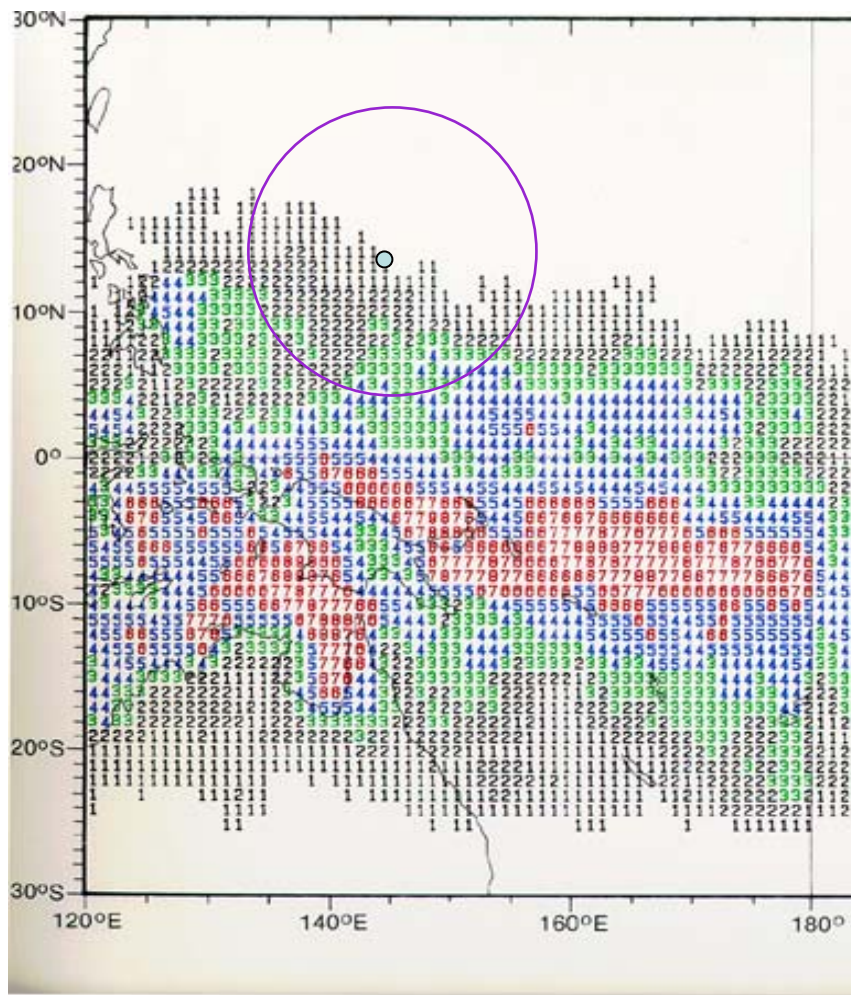
Site-specific meteorological considerations

- 1. Local weather variations - e.g. diurnal cycle at San Jose**
- 2. Amplitude and phase of diurnal cycle over region of interest - Night operations required/desirable?**
- 3. The tropical cyclone threat**

Outline

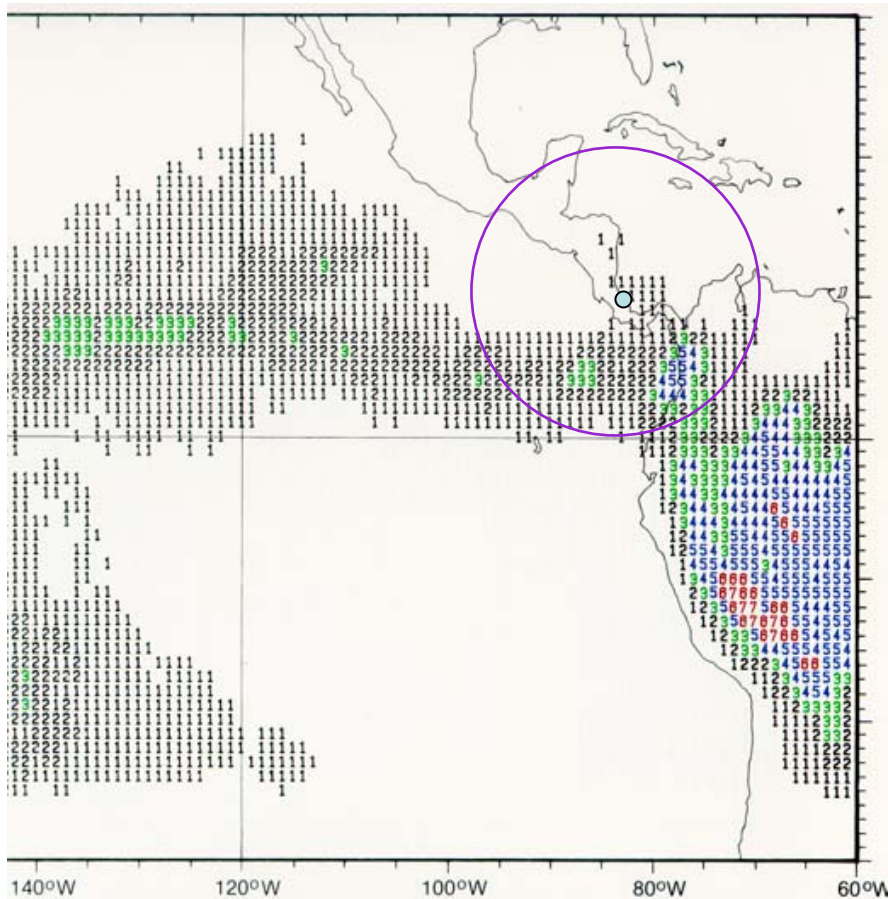
- **January and July frequency of Highly Reflective Cloud (HRC) - *atlas by Garcia***
- **Interannual variability of HRC**
- **Diurnal amplitude and phase over oceanic cumulonimbus from shipboard observations - *Warren atlas***
- **Animation of GOES-8 IR from July 1997 for the American tropics**

January - West Pacific HRC - July

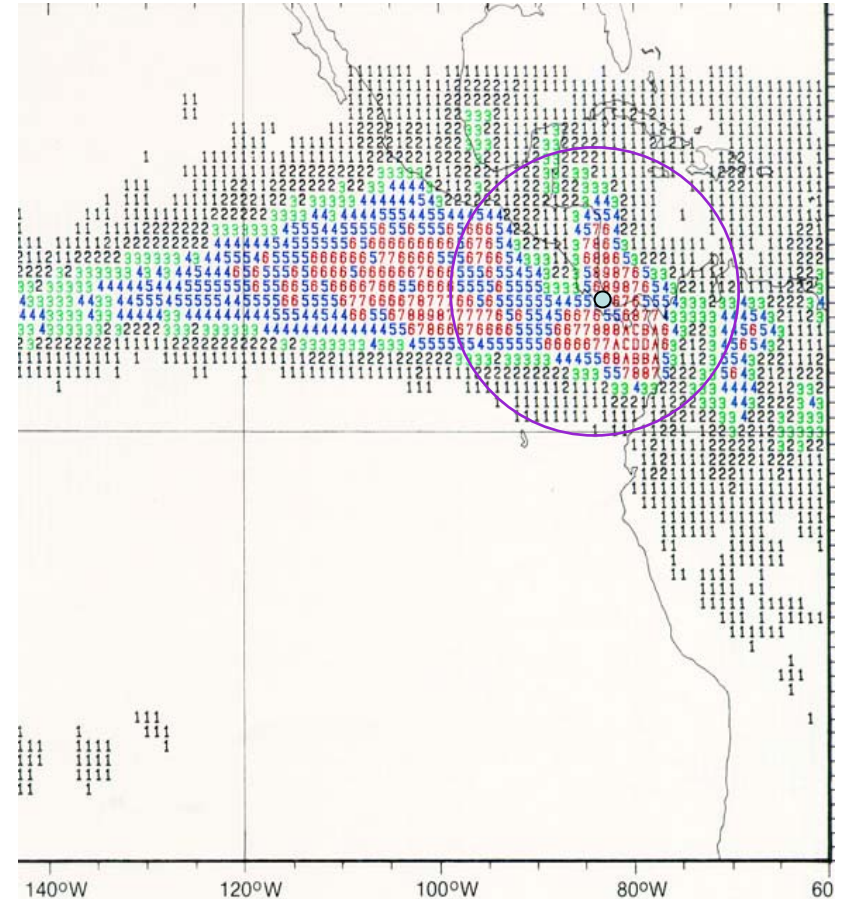


green: 3 HRC-days/month blue: 4 or 5 HRC-days/month red: 6 or more HRC-days/month

January East Pacific HRC July



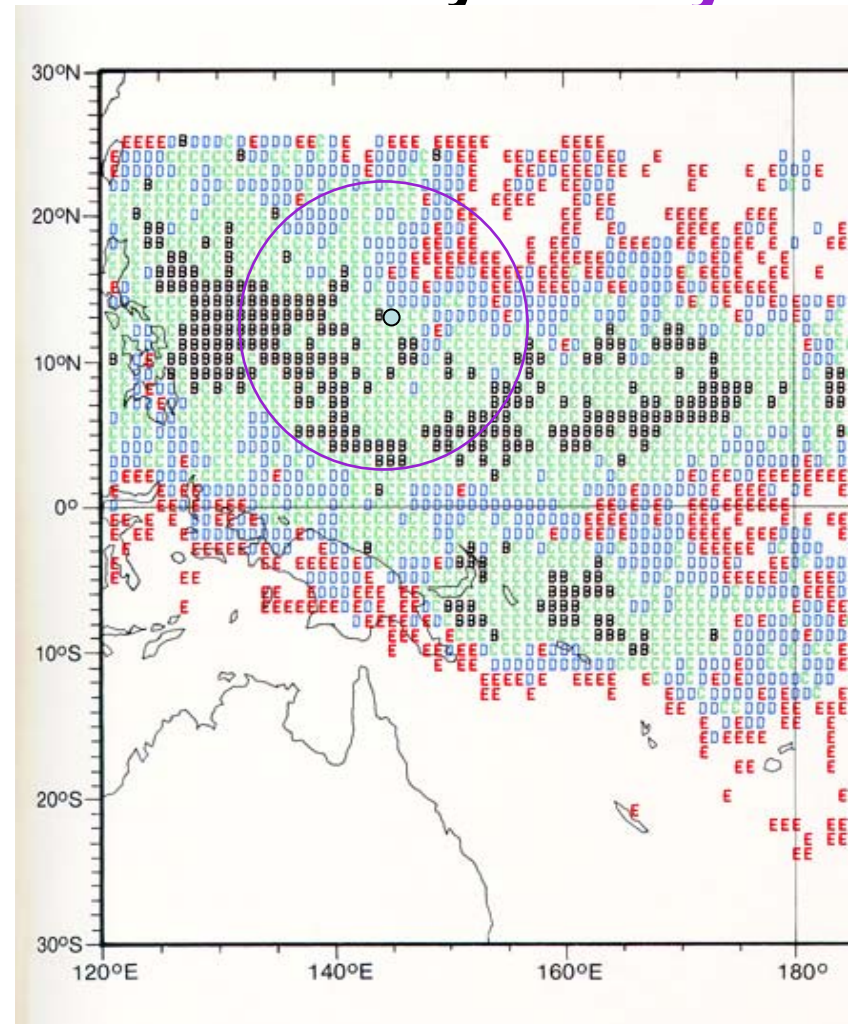
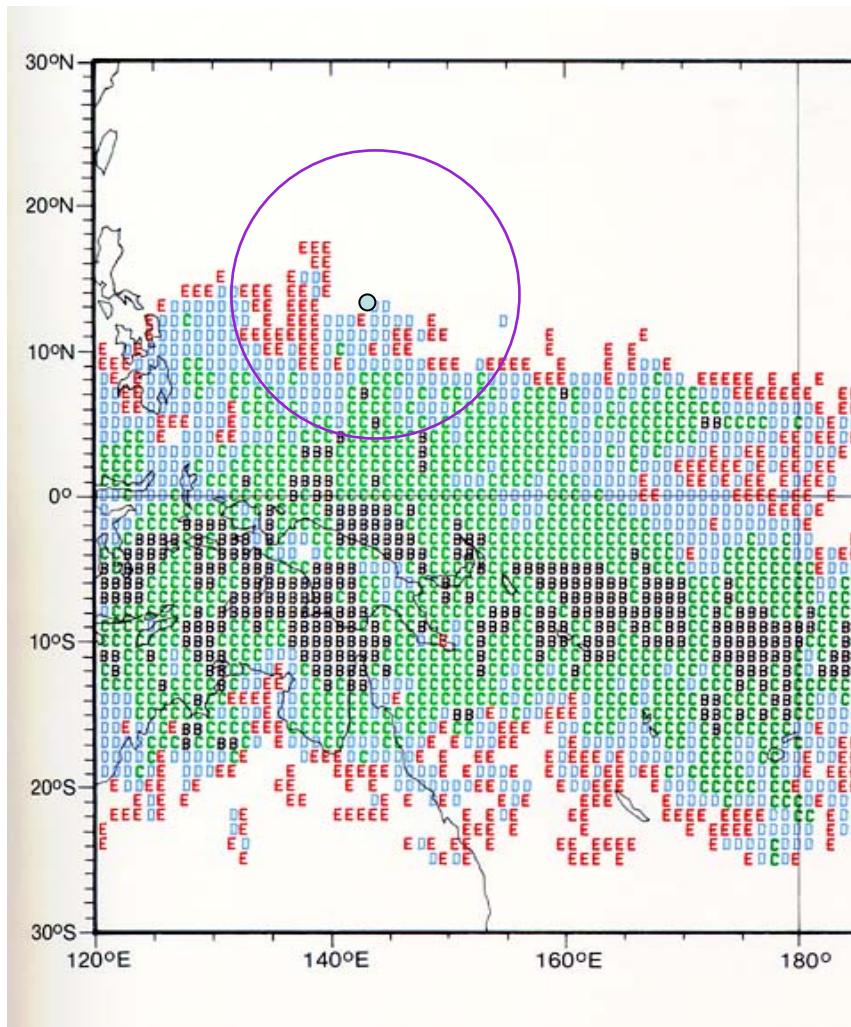
MEANS OF MONTHLY HRC DATA
January: 1971-1983
Pacific Ocean and Caribbean Sea



MEANS OF MONTHLY HRC DATA
July: 1971-1983
Pacific Ocean and Caribbean Sea

green: 3 HRC-days/month blue: 4 or 5 HRC-days/month red: 6 or more HRC-days/month

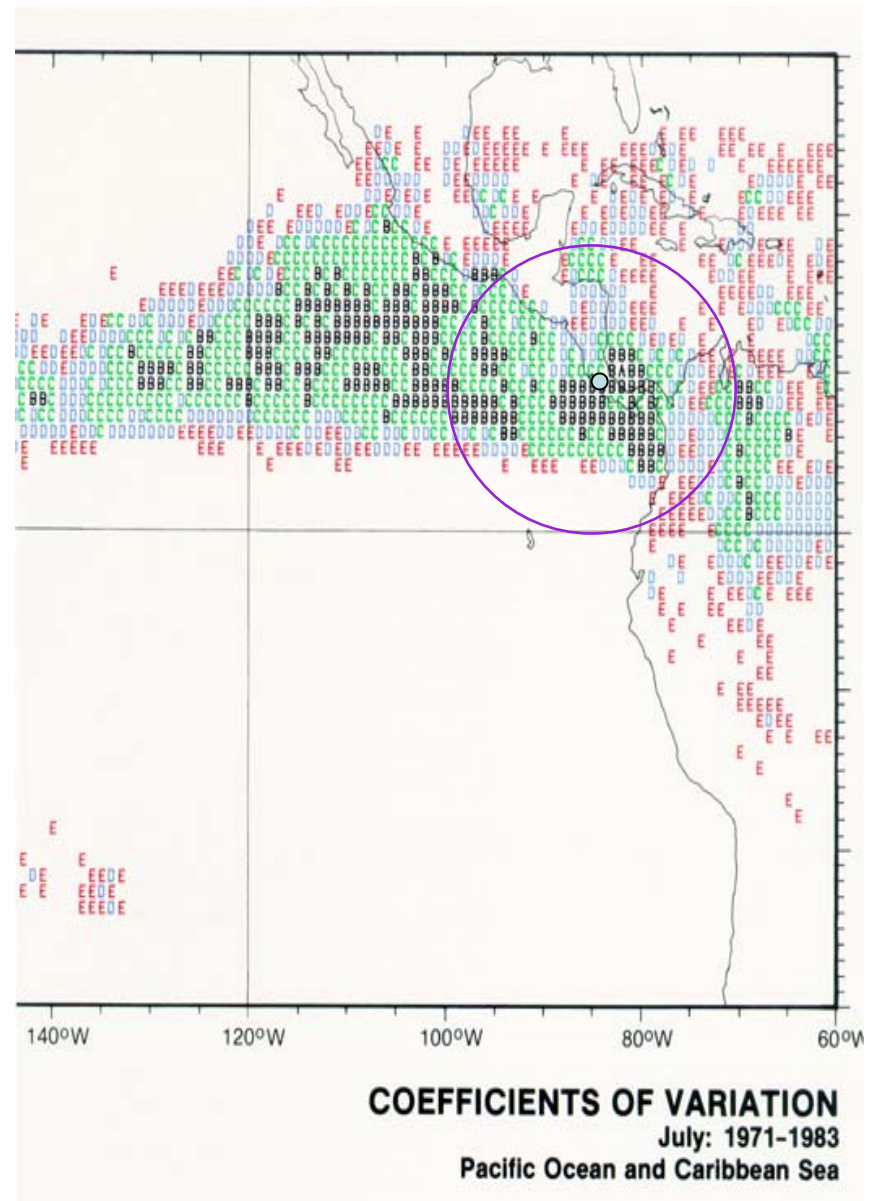
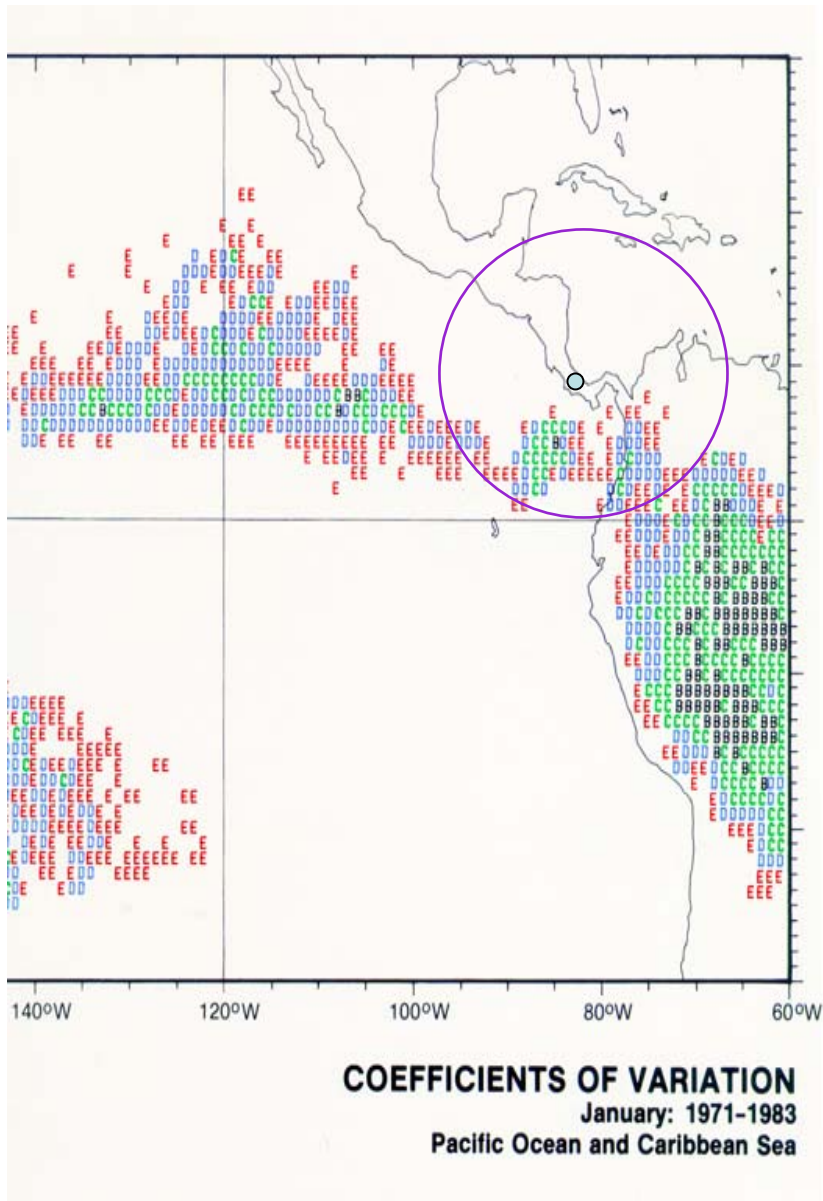
January - West Pacific HRC variability - July



Coefficients of Variation = Standard deviation/mean x 100

CV < 50% < **CV** < 75% < **CV** < 100% < **CV**

January - East Pacific HRC variability - July



CV < 50% < CV < 75% < CV < 100% < CV

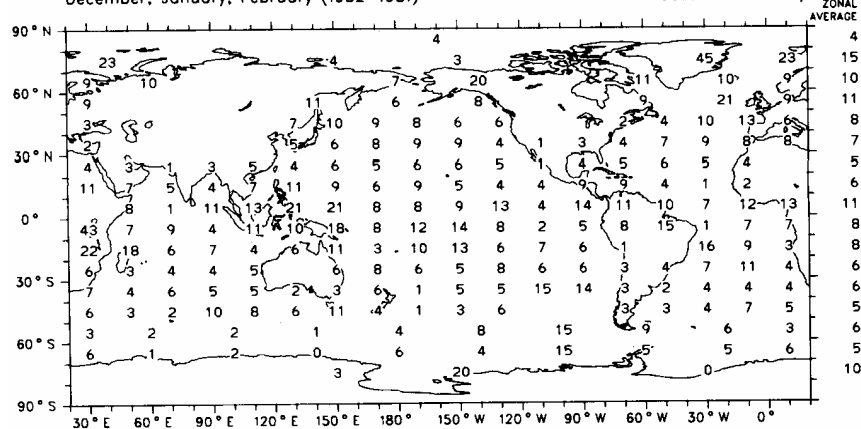
Cumulonimbus Diurnal Cycle

Cumulonimbus

Amplitude of Diurnal Cycle (0.1 % Cloud Amount)

December, January, February (1952-1981)

Ocean Areas Only



Map 130a

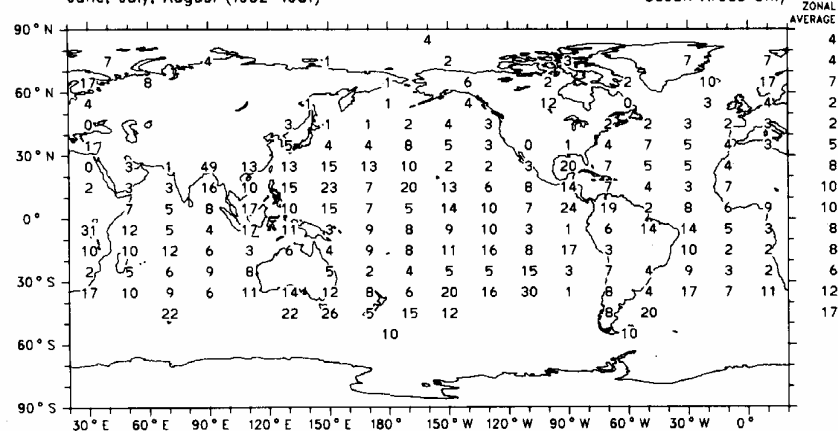
Global Average (Ocean) 0.7 %

Cumulonimbus

Amplitude of Diurnal Cycle (0.1 % Cloud Amount)

June, July, August (1952-1981)

Ocean Areas Only



Global Average (Ocean) 0.9 %

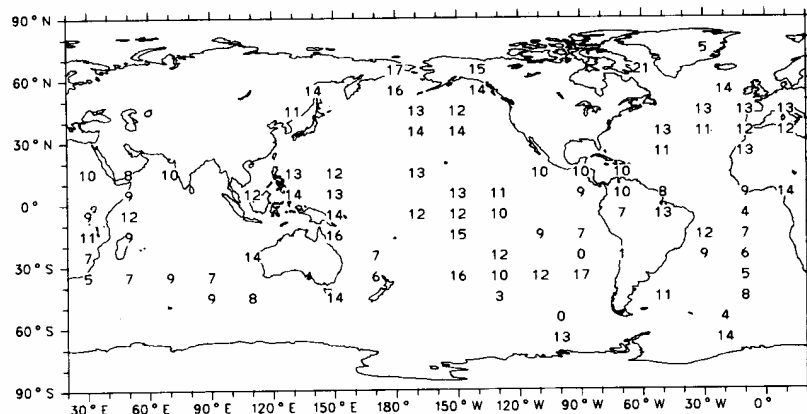
Map 131a

Cumulonimbus

Phase of Diurnal Cycle (Local Time of Maximum Cloud Amount)

December, January, February (1952-1981)

Ocean Areas Only



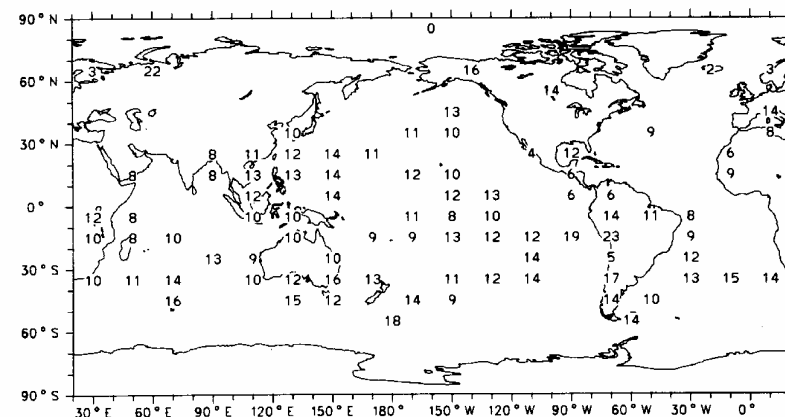
Map 130b

Cumulonimbus

Phase of Diurnal Cycle (Local Time of Maximum Cloud Amount)

June, July, August (1952-1981)

Ocean Areas Only



Map 131b

Dec-Feb

Jun-Aug

QuickTime™ and a PNG decompressor are needed to see this picture.

Summary

1. Costa Rica winter - some activity in Panama warm pool

2. Costa Rica summer

- Copious and reliable maritime convection over the Panama warm pool, offshore waters and Pacific ITCZ hurricane breeding region breeding during northern summer
- Complex interactions between synoptic disturbances and topographic and diurnal forcing - both locally at San Jose and in the Panama warm pool (Colombian coast)
- Interannual variability <50%
- Some diurnal variability over warm pool - early morning peak?
- MJO weak in this season and at these longitudes

3. Guam winter -

- main action south of Equator (SPC)
- Strong ENSO and MJO variability

4. Guam summer -

- Within W. Pac ITCZ but location of individual target systems NOT as predictable as in Panama
- ENSO and MJO less a factor
- Some evidence of mid-day peak of Cb frequency

Unanswered questions - Ongoing work

1. Costa Rica summer

- Nature of the diurnal window for flight ops at San Jose
- Characterization of diurnal cycle over Panama warm pool, in particular interactions with diurnal systems on Pacific coast of Colombia
- Magnitude of tropical cyclone threat - e.g. July vs. Sept?

2. Guam summer -

- Characterization of diurnal cycle
- Tropical cyclone threat